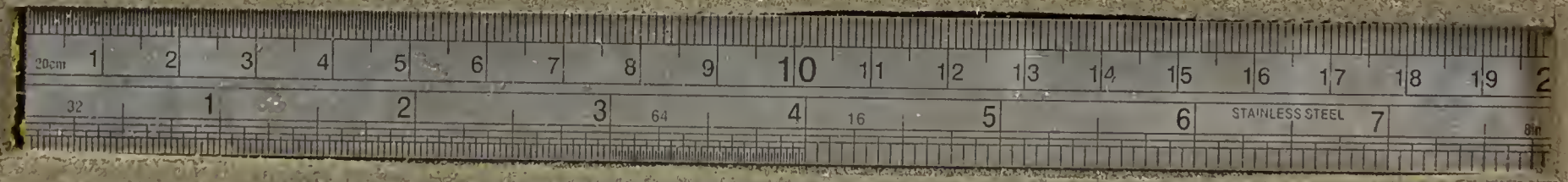

24ColorCard
CameraCraze.com


20cm
STAINLESS STEEL

REGIONAL

AND

SURGICAL ANATOMY

OF

THE HUMAN BODY.

ANO-PERINÆAL REGION.

In this region we find all the parts which are contained in the outlet of the pelvis. *Anteriorly*, it is bounded by the root of the scrotum; *posteriorly*, by the apex of the coccyx; *laterally*, by the tuberosities of the Ischia.

Form, oval, the greater extremity directed backwards. Anteriorly, along the median line of the integuments, we have an oblong prominence, which corresponds to the urethra, in the middle of which the raphe is placed: the anus is situated behind this prominence, and, more posteriorly, the apex of the coccyx. On each side of this *urethral prominence*, are two depressions, externally bounded by the internal and posterior part of the thigh and buttock; deeply, we can always perceive the rami of the ischium and pubis. The anus lies in a depression, bounded by the buttocks and tuberosities of the ischia. If we draw a transverse line from one tuberosity of the Ischium to the other, we subdivide this region into two: the anterior, called the *true perinæum*,—the posterior, the *false:* anteriorly, a triangle is thus formed, its base the transverse line; its apex the pubic arch; the sides (i. e. the prominent soft parts) of this triangle are somewhat convex, and hence its apex appears contracted and prolonged; its lateral measurement is about three inches and a half, its base usually measures three inches. A line drawn from the apex of this triangle to the middle of its base, and terminating before the anus, also gives three inches: by this subdivision, the perinæum presents two triangles, perfectly symmetrical.

In the lateral operation of Lithotomy, we cut through the left

triangular space in order to enter the bladder; to see the parts distinctly, we should separate the thighs, and bend them upon the pelvis; without this, there appears a mere fissure, in which are the anus, and root of the scrotum and penis: this depression, during a breech presentation, is converted into so very narrow a prominence, by the pressure which the thighs undergo in traversing the brim of the pelvis, that it has been frequently mistaken for the sagittal suture.

COMPONENT PARTS.

1. INTEGUMENT.

The following are the characters of this membrane, thin, pliable, yielding, and of a more or less brown colour; anteriorly is the integument of the scrotum; laterally and posteriorly it becomes thicker, and is continuous with that of the thigh and of the buttock; it is very delicate near the anus, and has wrinkles, which radiate from it as their centre; the hair is usually thick in the male; more follicles are found here than on the scrotum, but not so large, they are even more numerous around the rectum; their abundant secretion keeps the perinæum continually moist. Excoriations of a very painful nature (and severely so during defecation) occur round the margin of the anus, from the acrid fæcal matter mixing with this sebaceous secretion. The best treatment is to touch them with nitrate of silver.

2. SUPERFICIAL FASCIA.

Is thin, and reticular in the true perinæum; it has great mobility in the median line corresponding to the urethra, and is evidently a continuation of the superficial fascia of the scrotum: hence, the integument of the perinæum is very moveable, and it also follows, that infiltrations of urine and pus very readily pass into the scrotum, although they may have originated posteriorly. This is not unfrequent after the operation of lithotomy, and especially so when the first incision is continued too far forwards; and this infiltration of urine is the great objection to Giovanni de Romani's operation. The superficial fascia is always thicker and less uniform laterally; it is no longer merely reticular, for a number of strong decussating filaments occur, also some adipose cells, so that the texture is much denser, and forms a sort of elastic cushion, varying very much in thickness in different subjects. This fascia is thin in the false perinæum, on the median line, and can scarcely be traced between the superficial sphincter and integuments; so that the muscular fibres are in close apposition with the latter: hence, phlegmonous

abscess does not take place here, or, should it occur, the tumor is small and circumscribed, which is the reverse of the preceding.

Laterally, it consists of a great mass continuous with the superficial fascia of the buttock, passing anterior to the glutæus maximus, and filling that large triangular excavation between the two fibrous folds which cover the perinæal surface of the levator ani muscle on the one hand, and that which separates the internal obturator muscle from the perinæum on the other. It is here, particularly, that soft and sometimes reddish fat is found: it is cellular, has its filaments running in all directions, and is elastic. This adipose texture appears to be merely a degeneration of the perinæal fascia; whether this be the case or not, it is here that phlegmonous abscesses in the neighbourhood of the anus are formed, or those fæculent abscesses which precede the formation of fistulæ; in the lateral and transverse sections of lithotomy and all its varieties, it is here we always find urinary abscesses or infiltrations; the fluid burrows from one side to the other, between the rectum, coccyx, and posterior prolongation of the sphincter muscle, and between the anterior prolongation of the transversalis perinæi, the bulb, and membranous portion of urethra, and before the rectum; so that pus readily passes from the right to the left side.

3. APONEUROSIS.

This membrane, formerly described by Camper and other anatomists, and in 1811, by Mr. Colles, with much more precision, has been very lately made the object of some interesting researches by Carcassone and Bouvier: the structure is very intricate, and, in order to understand it, we must have recourse to the dead subject: you should first examine it in the *false perinæum*, and then proceed to the true.

In the false perinæum, there are two laminæ; one of these covers the perinæal surface of the levator ani muscle, and so proceeds as far forwards as the transversus perinæi muscle; posteriorly, somewhat before the coccyx, and a little above the external sphincter, where it degenerates outwards, and is lost in the superficial fascia: the other, which is attached to the free surface of the obturator internus muscle, becomes continuous inferiorly, with the internal edge of the great sacro-sciatic ligament and its falciform production.

Anteriorly, superiorly, and posteriorly, it appears a continuation of that lamina which we have just described as attached to the perinæal surface of the levator ani; so that a very remarkable triangular space is formed by their opposed surfaces, being separated and representing two inclined planes: the one (the obturator portion) proceeds from below upwards, and from without inwards; the other (the levator ani portion) also, from

below upwards, but from within outwards: or, perhaps, more correctly, these laminæ are two continuous parts of the one identical deep layer of the pelvic aponeurosis: the one (the obturator fascia) passes down to the ischium and sacro-sciatic ligament; the other (the levator ani portion) downwards to the verge of the anus. Posteriorly, this space ends in a *cul de sac*, bounded externally by the obturator fascia, which we have just spoken of; internally, by a continuation of the levator ani layer, which is here attached to the coccygeus muscle; and inferiorly, by the glutæus maximus. The obturator and levator ani layers send down a fibrous production, which passes over the inferior edge of the glutæus maximus, to continue itself on its external surface.

Anteriorly, there is another *cul de sac*, bounded upon its two sides by the two layers (the *obturator* and *levator* fasciæ) just described; inferiorly, by the superior surface of the transversalis perinæi. These two cavities are lined by aponeurosis, and full of adipose substance. Considering it as a single cavity, we may call it the *ischio-rectal space*. Inferiorly, it measures twelve or fifteen lines from one side to the other: it is an inch and a half or two inches from the apex of one *cul de sac* to the other, in passing along the bottom of the space. The obturator fascia is strong; its fibres fall vertically on the edge of the ligament: the inferior hemorrhoidal artery and a branch of the internal pudic nerve perforate it obliquely inwards and somewhat forwards; twelve or fifteen lines behind the transversus perinæi muscle the internal pudic artery proceeds, bound down by the obturator fascia. The levator fascia is thinner, interwoven, and more cellular than fibrous: its external surface appears to be broken up, so as to form an adipose cellular bed, which completely fills this cavity. Inferiorly, the levator fascia has no very defined edge, but becomes thinner and continuous with that of the thigh and buttock, and it is also incorporated with the superficial fascia. In considering this aponeurosis, in the anterior *cul de sac* of the *ischio-rectal* cavity, we find two layers placed horizontally: the one passing with an abrupt curvature downwards, on the posterior edge of the transversus perinæi, and then covering its inferior surface, also that of the erectores penis and accelerators urinæ, and the deep part of that space which separates them; it even extends to, and is lost on, the fibrous layer of the corpora cavernosa and urethra. Thus we find this thin layer or web spread upon the under surface of the muscles of the perinæum, the bulb of the urethra, and crura penis. It is attached externally to the rami of the ischium and pubis; anteriorly, is lost imperceptibly on the body of the penis; and posteriorly, is incorporated with the two layers of the false perinæum.

This aponeurosis then continues as the deep layer above these parts, to the vertex of the pubic arch, where it becomes identi-

fied with the concave margin of the triangular ligament of the pubis, and appears to form the latter. Perhaps it would be better to describe it as dividing, so as to cover the symphisis pubis, anteriorly and posteriorly. Its form must be triangular, as it is attached to the internal margin of the pubic arch, which it completely closes up: it is prolonged upon the urethra, while passing through anteriorly to the prostate gland; the rectum perforates the posterior portion in a similar manner: so that the deep or superior layer is separated from the superficial by the interposition of the crura penis, the bulbous portion and anterior half of the membranous portion of the urethra, together with the perinæal muscles: or, rather, it is an aponeurosis, between the two layers of which these several organs are interposed: this membrane is very irregular, yellowish, and elastic; just as the urethra passes through it, before the prostate gland it is continued into the pelvis, forming a capsule for this body, and more posteriorly in the false perinæum.

Mr. Colles, in describing this fascia, calls it the *triangular ligament* of the urethra; it is the *perinæal ligament* of Carcassone; it constitutes the septum which closes up the anterior half of the inferior outlet of the pelvis; so that pus and fluids, forming in this cavity, are not conducted by the cellular structure to the perinæum, as occurs elsewhere. Becoming continuous with the obturator fascia, it binds down the internal pudic artery; its chief use is to give support to the origin of the urethra, and preserve it in its proper position, and also to antagonize the diaphragm and abdominal muscles: the levator portion supports the rectum, and is sometimes so strong as to resist the introduction of the hand into this intestine. The prostate gland, the prostatic portion of the urethra, and the neck of the bladder in connexion with this gland, the levator ani, and anteriorly some vessels and cellular tissue, are interposed between the posterior production of the triangular ligament of the urethra, (which we have described as forming the capsule of the prostate gland,) and the levator fascia; in the lateral operation of lithotomy, the knife must pass through and above the latter, while the safety of the patient demands that it shall enter the bladder below, and not divide the former.

From the foregoing considerations, we can readily understand the consequences attending on, and resulting from fistula in ano, and several accidents taking place after lithotomy; and why acute phlegmonous inflammation, engaging the structure in the depression between the tuberosity of the ischium and rectum, occupies the whole space between the obturator and levator fasciæ: the suppuration and detachment of the cellular structure makes this a vacuum; so that, when the destruction of the integument is commensurate to the deep seated burrowing, cicatrization is difficult, from the immobility of the external, and the alternate approximation and separation of the internal,

parietes, as the rectum is full or empty, and so they cannot be preserved in contact. Hence, blind external fistulæ frequently take place, requiring the same treatment as the complete: the former occasionally admit of a spontaneous cure, as Foubert has observed. In the gangrenous or stercoraceous abscess, the obvious reason of the difference depends upon the cause existing in the rectum, and upon the nature of this cause, which produces the most speedy and extensive disorganization, notwithstanding incision of the intestine in both cases: you may suppose that, should you have destruction of the cellular substance, and a breaking down, as it were, from long continued suppuration, making excavations deep enough to form a large cavern, extending as far posteriorly as the apex of the coccyx and glutæus maximus: that the restoration of those parts about the rectum can only be attained by the appropriate treatment which Richerand points out—country air, succulent diet, and such as leaves the least quantity of fæces.

The operation by simple incision, that of Celsus, by excision—that by cautery and ligature, will not always succeed in arresting the destruction. The radical and decided cure appears to be effected most frequently by laying open the whole extent of the diseased structure, and by a free division of the undermined integument. Boyer and Roux follow this practice, at la Charité, and consequently their treatment is most successful; yet we are not to conclude that all fistulæ require this mode of proceeding, for we know that the mode by incision or by ligature is frequently effectual; but those have been cases where the integument has been undetached from the subjacent cellular structure, which has not been destroyed by suppuration.

After the lateral operation of lithotomy, according to Le Dran, Foubert, and Thomas, or indeed any of the other forms, should the incision of the integuments not be prolonged enough posteriorly, the urine becomes effused into the cavity between the tuberosity of the ischium and rectum, frequently producing dangerous inflammations, and much more so as the suppuration makes its way from the deep parts towards the integument, condensing the cellular structure, and thus closing up this cavity by its thickened laminæ: in this state, it is exceedingly difficult to detect fluctuation. The anatomical arrangement of the superficial fascia, with relation to the aponeurosis, indicates that, early, deep, and extensive incisions are to be made, whenever we find even a tendency to a formation of matter.

4. MUSCLES.

a. Sphincter Externus is the most superficial, sometimes very thick, at others not well marked, *arises* always posteriorly,

from the recto-coccygeal ligament; anteriorly it gradually becomes thin, its fibres are pale and pass between the integument and the accelerator urinæ muscle, having a close *insertion* to its posterior part; (central tendinous point;) and are gradually lost under the urethra in the superficial fascia. This muscle most generally terminates on a plane with the central tendinous point of the perinæum, in some degree incorporating with the muscular fibres which cover the bulb. We have frequently found it continue along the superficial fascia to the root of the scrotum, and to become identified with the dartos.

When you carefully dissect the sphincter of the anus, you perceive that it is made up of two orders of fibres—the internal form complete and regular circles, immediately surrounding the external surface of the intestine and the integument which folds within the anus—the external are elliptical, and meet at an acute angle; anteriorly and posteriorly separated in the middle into two fasciculi by the opening of the rectum; the *former* appear to be merely a continuation of the muscular coat of the rectum and these alone can close up the aperture and produce concentric rugæ in the inverted integument, which fully preserve the annular form of this opening.

The latter form the proper sphincter, and, from the arrangement of their fibres, include an opening necessarily elliptical, giving to the anus the appearance of an oblong fissure which it would be but for the action of the circular fibres. Very extraordinary permanent spasmodic contractions take place in this muscle, noticed first by Boyer, which are generally excited by excoriations or fissures in the cutaneous rugæ, taken notice of by Avicenna, Lemonier, and Sabatier consecutively. If simple excoriation has been the cause of this contraction, they are readily healed by a solution of the nitrate of silver: on the other hand, should they be produced by fissures, success usually follows from the making of one or more incisions.

We would at first suppose, that the division of the sphincter, in this case, in the operation for fistula, and that of recto-vesical lithotomy, should be inevitably followed by an incontinence of fæces; but we do not find that this occurs, for the organ resumes its functions, and that very shortly afterwards. "The anus has two sphincters, an internal and an external, both of which are merely the circular fibres of the rectum, in a greater degree of developement."

"*Sphincter ani internus.*—The longitudinal fibres of the rectum are deficient for three or four lines, and terminate at a flat ring of very red and thick circular fibres, which constitute this muscle, they are two lines thick at that part, and one and a half immediately under the integument where they diffuse themselves inwards."

"*Sphincter ani externus*—larger than the internus—distinctly separated from it. Internal fibres, nearly straight; external,

very convex, posteriorly attached to the last bone of the coccyx, frequently terminates muscular or tendinous in the perinæum, without arriving at the central tendinous point; more oblong in the male—greatest diameter from before backwards. In the female, more circular, but broader and stronger in its anterior part, where it is connected with the constrictor cunni—sexual differences which depend upon the form of the pelvis and the external organs of re-production."*

"The penis has three muscles—one (erector penis) belongs to the corpus cavernosum; the other two are destined for the urethra; the anterior, (accelerator urinæ,) for the bulb; the posterior, (constrictor urethræ,) for the membranous portion."

b. Accelerator urinæ appears to be in fact, a continuation of the sphincter ani, surrounding the whole of the bulb, and a part of the spongy portion of the urethra; its fibres arise in the groove which separates the corpus spongiosum from the corpora cavernosa, and also from before the rectum. Hence it should compress the urethra when it contracts, and retard or accelerate the flow of the urine according to its position in the canal. These muscles sometimes spasmodically contract, and so give a momentary resistance to the introduction of instruments; they are lost posteriorly in the central tendinous point of the perinæum, between the rectum and bulb. In lithotomy by Mariano Santo, the division of these fibres lays the foundation for urinary fistula. The superficial and deep perinæal fasciæ separate this muscle from the integument, and the urethra alone separates it from the triangular ligament, to which its external fibres are attached.

"This muscle is thin, flat, perhaps rhomboidal, surrounding the bulb and the posterior part of the urethra, arises anteriorly from the posterior part of the corpora cavernosa penis, posteriorly from the upper part of the lateral parietes of the bulb of the urethra. It consists, anteriorly, of very oblique fibres, those running posteriorly more transverse, and so accurately unites in the median line with its fellow, that each half is frequently not distinguished by any median tendinous raphe."*

c. Erector penis is attached to the root of the corpus cavernosum, as the accelerator urinæ is on the bulb; being also interposed within the two aponeurotic layers, merely separated from the accelerator urinæ by a triangular space; its base posteriorly, its floor the triangular ligament of the urethra. In fact these two laminæ are not separated in this space by any intervening organ, but incorporated into one. It is never interfered with in any of the operations of lithotomy, for the incision should be always made posterior to the triangular ligament, in order to arrive at the membranous portion of the urethra.

"This muscle covers the crus penis, arises by very short tendons from the internal surface of the ramus of the ischium,

* Professor Meckel's Handbuch der Menschlichen Anatomie.

sometimes by two origins from the tuberosity, and proceeds as far as the termination of the crus."

d. Transversus perinæi. The triangular space which is bounded laterally by the two preceding muscles has for its base the transversus perinæi; it *arises* from the internal margin of the ischium within the crus penis, about an inch before the tuberosity of the ischium, then proceeds horizontally towards the median line, where it incorporates with its fellow and the accelerator urinæ. (central tendinous point). You will find that they form a decussation, which will be seen on raising the anterior fibres of the superficial sphincter of the anus, lying between the bulb and the rectum. This muscle appears to be useful in making tense and strengthening the two aponeurotic layers between which it is found. Its strong and dense fibres are almost identified with those of the aponeurosis, which is particularly solid here; so much so, that the superficial layer of the aponeurosis sometimes forms a very marked band at the posterior and inferior surface of this muscle. The transversus perinæi proceeds from its origin obliquely forwards and inwards to its insertion. These muscles are generally divided in all the operations of lithotomy.

"*Musculi Transversi, Posteriores, et Anteriores.* The posterior usually draw the anus somewhat backwards, and compress it from before backwards, and also assist in defecation. The anterior more constant than the former, open the posterior part of the urethra in the male, and the vagina in the female. These muscles lie more closely in the male, and are much weaker than in the female. There is even a third sometimes found in the latter."

Levator Ani et Ischio-Coccygeus muscles have their inferior portion only in the ano-perinæal region. The fibres pass down obliquely inwards, and by their union form a raphe between the coccyx and rectum, above the posterior extremity of the sphincter, and, anteriorly between the rectum and urethra, above the transversus perinæi, with which they are incorporated. These muscles united, form a sort of musculo-membranous pouch perforated at the bottom by the rectum: the levator layer of fascia covers its external surface. They exclude the pelvis from the false perinæum, and form a *real* muscular septum which opposes the action of the diaphragm and abdominal muscles. Its numerous rays, by their contraction, elevate, and at the same time dilate the anus, and thus overcome the action of the sphincter so that in defecation, as the levatores ani resist the viscera pushed by the diaphragm downwards, they draw the perinæal extremity of the rectum from the centre to the circumference, and thus oppose the sphincter which relaxes either spontaneously or by having been overcome.

"This muscle draws upwards, and contracts the inferior part of the rectum at the same time, and so prevents a prolapsus ani, and thus assists defecation. It draws the coccyx upwards and

forwards during this act, or that of parturition: it also assists the passage of urine and semen; for it draws up and contracts the urinary bladder, and vesiculæ seminales; in the female it prevents a prolapsus vaginæ."

"Le Dran proposes to call it also levator vesicæ."

The anterior junction of the fibres of the levator ani, is always divided in the recto vesical operation; but this should not take place in the other methods. However, when the intestine is very large, and flaccid, and a sufficient inclination outwards is not given to the knife, the levator ani, and even the rectum itself, may be divided. In the operation of fistula in ano, they are incised more or less upwards, and so in a direction parallel to their fibres; and hence, when united, their action does not appear to have suffered from the division. They may be cut high up in the depression between the tuberosity of the ischium and rectum, without endangering the peritoneum; but above this you divide the fascia which separates you from the pelvis.—The internal surface is described with that cavity.

5. ARTERIES.

To perform lithotomy with safety, we should be intimately acquainted with the most important branches of the arteries. They all arise from the internal pudic, except those from the inferior mesenteric and internal iliac; but we shall only now consider the former.

Arteria pudica interna is situated between the two sacro-sciatic ligaments, and protected by the falciform process of the greater and the tuberosity of the ischium. The edge of the glutæus maximus also separates the internal pudic artery from the integuments, and its intervention keeps this vessel some distance from the surface. However, Mr. Harrison relates that Mr. Travers, surgeon of St. Thomas's Hospital, London, repressed a violent hemorrhage, which resisted all other means, by compressing the internal pudic artery against the ischium, or its spinous process, in a very simple way, by placing the patient supine on a hard bed. This object may, perhaps, be better attained by securing between the coccyx and the tuberosity of the ischium a piece of cork, gum-elastic, or graduated compresses. In fact, this artery might be taken up here, thus—by making an incision from above the base of the coccyx to the great trochanter, through the integument and superficial fascia, separating the fibres of the glutæus maximus as far as the sacro-sciatic ligament. You then divide transversely the inferior lip of the wound as far as the ligament, which is to be then cut, without being obstructed by muscular contractions. The ligament being divided, there is no further difficulty in passing the ligature.

The internal pudic artery proceeds along the internal surface of the tuberosity and ramus of the ischium; merely applied upon the external surface of the obturator fascia, it becomes gradually included in its layers so completely, that before it approaches the posterior edge of the transversus perinæi, it is already enclosed in a complete fibrous canal. It proceeds above this muscular plane and the crus penis, always making towards the arch of the pubis. The vessel becomes more superficial as it advances, but is, however, covered by the deep fascia up to its ultimate division into the artery of the corpus cavernosum and the dorsal branch of the penis. Thus the trunk of the pudic artery is firmly bound down in its whole extent. Hence it is immoveably fixed and perfectly uninfluenced by any force or change of position operating upon the perinæum. This artery, while within the ischium, is about one inch and half distant from the anus. It so coasts along the rami of the ischium and pubis, that there is no possible danger of wounding it in lithotomy, unless you neglect all the rules which have been laid down. In tracing it inferiorly, we find it one inch above the ischium; but superiorly, it is merely half an inch above the plane of the crus penis: so that in the living body it is far removed from the integument, and placed out of the reach, as it were, of the knife during the incision of the soft parts. Its relation with the aponeurosis renders it very difficult, if not impossible, to tie this artery, should it be unfortunately wounded. Perhaps the actual cautery presents the only rational means of success; for compression does not prevent effusion of the blood between the obturator internus muscle, or levator ani and aponeurosis. The pudic artery furnishes three principal branches. The first is the

Arteria hæmorrhoidalis externa, which comes off from the trunk, and perforates the obturator fascia twelve or fifteen lines behind the transverse muscle, and consequently some lines before the pudic is applied upon the internal surface of the tuberosity of the ischium. On entering the cavity between the tuberosity of the ischium and the rectum, this branch proceeds transversely towards the anus, and divides into small branches which pass into the cellular mass which fills this space. As it passes from the aponeurosis, its size is sufficiently considerable for us to fear a hemorrhage from its division, which certainly should not occur in the several forms of the lateral operation of lithotomy, unless the incision is carried into the false perinæum, which is not generally approved of. However, as its position is not very deep, and as its direction is somewhat obliquely forwards, we may divide the artery should the incision be made too near the rectum, more especially should we extend it three or four inches, having commenced about ten or twelve lines before the anus, as S. Cooper, Hey, and others have recommended.

This branch could much more readily be included in a ligature than the pudic itself, because it is easily found in the adipocellular structure about the anus. In the operation for fistula in ano by excision, its division rarely gives rise to serious hemorrhage, because it ramifies minutely, perhaps about an inch beyond the anus—the hemorrhage is either arrested spontaneously or by slight compression. We should not forget that the hemorrhoidal artery sometimes proceeds so much forwards as to be very near the transversus perinæi; and, indeed, in such instances, it must be difficult to avoid it in the lateral operations. The second is the

Arteria superficialis perinæi, which separates from the pudic about half an inch behind the transversus perinæi, winding under it, and then proceeding through the superficial fascia, divides at two, three, or four lines from the rami of the ischium and pubis, and arriving in the external part of the triangular space, formed between the accelerator urinæ, erector penis, and transversus perinæi, (the *bulbo-ischiatic triangle*,) coasts along the internal side of the erector penis and ramifies on the body of the penis, being ultimately lost in the septum scroti. Thus we find this artery deep posteriorly, and very superficial anteriorly. Externally it gives one remarkable branch, which crosses the crus penis, to be lost on the inside of the thigh. Internally, the branches are too small to be of surgical importance; but it sometimes gives off the *arteria transversalis perinæi*. It is easily avoided when towards the external side of the perinæum; but it is sometimes found near the median line. In this case we should endeavour not to divide it. This branch is the largest of those which come from the internal pudic, and this frequently causes much hemorrhage after the operation of lithotomy. It may be wounded in this operation by approaching too near the rami of the ischium and pubis, while endeavouring to avoid the rectum, also in the transverse section, when the incision is made too far before the rectum, in which the knife is carried very much outwards. When the artery is wounded some distance posteriorly from the median line, the hemorrhage is always more considerable. This is also true of the other arteries of the perinæum.

Arteria Transversalis perinæi, often given off by the preceding, but more frequently by the internal pudic, *arises* near the posterior and external edge of the transversus perinæi, passing obliquely from without, inwards, and from above, downwards, running superficially to its termination. This vessel divides near the median line into three principal branches: the first is found before the anus and the rectum; the second, between the rectum and bulb, and the third, within the bulb itself—all anastomose with those of the opposite arteries, and thus form a very intricate and vascular net-work, placed exactly in the site of the incision of lithotomy. More or less effusion of

blood takes place from the division of this part. The artery itself is also divided in this operation, as the incision is always made very near the bulb, in order to avoid the rectum. The commencement of the incision, divides the branches; the termination of it passes through the trunk of this artery. Hence directions to avoid the division of this branch are altogether useless. The circumstance of its not being wounded is merely accidental, or probably owing to irregular distribution. Hemorrhage from it, is generally so inconsiderable as not to require attention. Indeed as it is placed between the two laminæ of the triangular ligament, it would be exceedingly difficult to secure it by ligature; but we cannot apply the same objection to the use of compression of this vessel, as has been done to this mode of arresting hemorrhage from the internal pudic. In extreme cases we may have resort to the actual cautery, as in that of the pudic trunk itself.

Strictly speaking, we may avoid this branch in practising the bilateral operation, an advantage which it certainly possesses; but to attain this object, we should commence the external incision not more than six lines before the anus. Thus we endanger the rectum very much, in order to avoid a branch of little importance compared with a wound of this intestine.

Hence, we find, that it is the superficial perinæal artery only, which probably may give a troublesome hemorrhage; for no surgeon would ever wound the deep vessel, unless, perhaps, some most unusual irregularity of this artery occurred.

6. VEINS.

The internal pudic artery, and its principal branches, are generally accompanied by two veins. They are very large, often sufficiently so to form a plexus in the perinæal region of those advanced in life, but especially in those affected with calculus; their course is, in general, the same as that of the arteries: they enter the pelvis by the ischiatic notch; some of them approach the rectum, and interweave among the muscular fibres and the mucous membrane of this intestine, so as to constitute a sort of erectile network, in which hemorrhoids are formed. There is also a plexus round the prostate gland, in which the veins are so numerous, that the mere incision of the gland is frequently followed by very copious hemorrhage: the surgeon is frequently embarrassed in most of his operations on the perinæum, by these plexuses, and the varicose state of the veins.

7. LYMPHATICS.

This system is not of any importance here; no lymphatic glands are found; these vessels proceed either into the groin or pelvis.

8. NERVES.

The nerves requiring attention here are, the ischiatic branch of the small sciatic nerve, and the internal pudic: the former of which turns from the sciatic notch upon the internal surface of the tuberosity of the ischium, always covered by the superficial fascia, and is not unfrequently included in the external incision of the soft parts, in the various operations of lithotomy: the latter closely applied upon the artery, and inclosed in the same sheath, is distributed in a similar manner; this renders it difficult to exclude the nerve, in securing any of the branches of the artery, which, however, should always be strictly attended to.

9. URETHRA.

The length of this canal, extending from the neck of the bladder to the extremity of the penis, is nine inches. Whately and Ducamp, say, that it never exceeds this length; we, however, agree with Lisfranc, that it is sometimes found so long as eleven inches. This is the most important organ of the perinæum, as much on account of its functions in disease, as for the numerous operations performed upon it. J. L. Petit first demonstrated that in the depending state of the penis, the urethra presents two well defined curvatures. Hence he constructed his *S* sound, from his exaggerated conceptions of the subject. One of the curvatures has its concavity looking upwards, and passing under the symphisis pubis, the other concave, downwards, occurs before this articulation; so that during erection it disappears; or when the penis is drawn up towards the abdomen in the continued direction of the rami of the ischium and pubis. The opinion lately maintained, that the urethra is straight, or nearly so, had its origin from the preceding circumstance. Although this assertion is not strictly correct, yet Amussat has shewn, that when we make a suitable elongation of the penis, we not only remove the anterior curvature, but even do away with that which is beneath the symphisis pubis; and hence concludes that a straight instrument might be introduced into the bladder. Leroy and Civiale, have latterly considered the question *ab ovo*, respect-

ing the breaking up of calculus and its destruction by the galvanic fluid, and have established the practicability of this, one of the most interesting and important surgical operations of the present age.

We shall first consider the four portions of the urethra separately, and then resume its direction.

1. PROSTATIC PORTION. Its length is about twelve or fifteen lines, surrounded by the gland from which it derives its name; and hence we have to consider this latter organ first.

Prostate gland. Its form is that of a cone, flattened upon its posterior surface, the apex directed anteriorly, of a very small size in children, but enlarging progressively with age; in the adult of eighteen or twenty-five years, its greatest size is two lines less than that of the man of forty: in the old man, and those affected with diseases of the bladder, its size even far exceeds this. Its dimensions should be accurately known and fully appreciated, when the surgeon wishes to perform lithotomy. Fifteen lines is its greatest diameter at its base, four or five only at its apex. In making a vertical transverse section near the base, the deepest part, through which the urethra passes, measures twelve lines, or sometimes fifteen, from above downwards, and its dimensions gradually diminish to the point.

We should remark, that this gland is not precisely circular in its circumference, and that the urethra does not pass through its centre; so that to obtain essentially surgical and practical measurements, we must follow the method of Senn, and draw several radii from the canal of the urethra, to the principal points at the circumference of the prostate, we find the lower radius six, seven, or eight lines, but seldom more; considered transversely, about nine lines, and ten or eleven downwards and outwards. In the lateral operation of lithotomy, the instrument passes in this direction.

The inferior, or posterior surface of the prostate, is its flattened portion, which lies upon the anterior surface of the rectum, about two and a half, or three inches above the anus; it is merely separated from this intestine by a thin layer of reticular cellular structure, and which consequently is never the seat of adipose deposit; this renders it difficult to avoid wounding the rectum, when we completely divide the posterior portion of the prostate: an entire section of this gland can never be made in any of the operations beneath the pubis, without incurring the probability of dangerous consequences. Hence, in the incision by the rectum, we cannot obtain, without considerable risk, an opening as large as that by the lateral, or transverse method; the pubic surface of the prostate is always half an inch or eight lines distant from the symphisis: its lateral parts are six or eight lines distant from the rami of the pubis and ischium, according as we examine it at its superior or inferior part. This we can readily understand when we re-consider the transverse measure-

ment of the prostate. At its largest part, it is eighteen or twenty lines, measuring from the arch of the pubis; from the superior, middle, and inferior parts of the gland, it is twenty-two, twenty-four, twenty-five, twenty-six, and twenty-eight lines; so that the prostate is nearest to the internal pudic artery at its superior part.

There are a great number of other parts enveloping the prostate, more or less closely, and which you will find between the symphisis, rectum, and internal pudic artery. It is surrounded by a layer of longitudinal muscular fibres, not always equally distinct, which are incorporated with its proper capsule. We have frequently traced these fibres to the bladder, they appear to us, merely as a continuation of the muscular coat of this reservoir, and are better marked superiorly, so much so, that they are sometimes almost exclusively found above the canal of the urethra; and hence Amussat has said, that this canal does not pierce the prostate, but is embedded in a sort of groove in its substance. I have found this arrangement more than once, that the structure of the gland ceased at the sides of the canal, and had its anterior surface covered by muscular fibres only; but this is speaking too generally: the prostate, most usually, forms a complete circle around the urethra; but the latter passes through the gland much nearer the superior, than the inferior part of the circle; although the reverse has sometimes been observed. If such were the case, it would be difficult to avoid wounding the rectum, by any operation except the transverse.

"A strong fascia connects the anterior part of the prostate to the symphisis pubis, and to the descending rami of each of the bones forming it. As this fascia approaches the gland, it sends off on each side two thin planes of fleshy fibres, which spread out, and are connected to the lateral external surface of the gland forming what Winslow has called the *prostatici superiores et inferiores.* These fibres, with their tendinous fascia, serve to sustain the gland, and pressing on its substance in their contraction, will aid in passing the secreted fluid from it into the urethra. The urethra passes through the prostate, not actually from the base to the apex, but it begins to enter about one-fourth part of the length of the anterior surface of the gland, below and before the base; it also passes by at least one-third of the thickness of the gland, nearer the anterior surface than the posterior one. The gland can readily be felt by a finger introduced into the rectum; so that its healthy or diseased state can be ascertained from the cavity of that gut."*

The prostate has two additional small muscular fasciculi on its superior surface, which belong to the levator ani, and which arise behind the symphisis pubis, and descend nearly vertically,

* Wilson's Lectures on the Urinary Organs—p. 137—9.

surrounding the origin of the membranous portion of the urethra; they are more or less developed in different individuals, and are named Wilson's muscles. The gland is enveloped in a fibrous capsule, very nearly complete, and continuous upon the one side with the pelvic fascia, of which it appears to be a prolongation, and on the other, with that of the perinæum, of which it appears to be a production: where it has been expanded on the membranous portion of the urethra, there is a cellular tissue, outside this capsule, loose and very abundant laterally and anteriorly, very dense posteriorly in the median line, and much less so externally.

The base of the prostate receives and envelopes the neck of the bladder, at the part where the urethra takes its origin; the vasa deferentia penetrate this gland, run nearly parallel, and lie contiguous to each other; the vesiculæ seminales are situated posteriorly and externally to these ducts; so that in entering the bladder from the rectum, (recto vesical operation,) according to the first proposed method of Sanson, by which we divide the fundus of the bladder, and also some of the base of the gland, the spermatic canal, and frequently the vesicula seminalis of one side are in danger of being wounded; for no surgeon in incising the anterior parietes of the rectum, can be certain that he has not deviated half a line from the median one.

"The vesiculæ seminales lie more parallel and more close to each other, than is generally imagined: that they lie in contact with each other for some length before they reach the prostate gland, that in the interval between them, the peritoneum descends very low towards the base of the prostate, and that consequently, a small portion only of the bladder remains naked, included between the vesiculæ seminales, the lower attachment of the peritoneum, and base of the prostate. Examine now the depth at which this naked part of the bladder lies from the anus, and then judge whether it be probable, that in puncturing the bladder from the rectum, the instrument can be unerringly entered at this spot, or whether it be not that it will be pushed through the anterior extremities of the vesiculæ seminales, where they lie in close contact with, and parallel to each other. Does not the pain which is felt in the glans penis at the moment of the puncture, tend to strengthen this supposition? Should the operator, from solicitude to avoid the vesiculæ seminales, pass the trocar still higher up in the rectum, he must then be in considerable danger of wounding the peritoneum."*

The recto vesical operation appears to Scarpa so serious, upon this account, that he is induced to reject it, however Sanson and Vacca think otherwise. Indeed many observations prove, that a wound of the spermatic canals, may cause their

* Colles' Surgical Anatomy, p. 183—4.

obliteration, and even atrophy of the gland. Lapeyronnie relates a case which proves that loss of the testicle may supervene upon an alteration of the vas deferens; for the conjoined ducts of the vasa and vesiculæ penetrate the prostate from behind forwards, and so pass through almost the whole length of the gland. Hence in the recto-vesical operation, one of these ducts must, unavoidably, be divided, whatever precaution may have been used; and two unhappy circumstances may then take place, either inflammation of the testis, transmitted by the continuity of the mucous membrane extending from the urethra to this organ, or perhaps the cicatrix may alter the relative position of the divided ducts, and so occasion sterility by their insulated obliteration; indeed atrophy of the gland may supervene, either in the former or latter instance; it is not unusual to find hernia humoralis as an attendant upon even a slight gonorrhœa, or during the use of bougies and sounds, and even subsequent to the lateral operation.

The posterior edge of the prostate, is formed of three lobes, in some subjects; so that the middle lobe, when enlarged, pushes from below upwards the neck of the bladder, and thus obstructs or obliterates it. Sir Everard Home looks upon this enlargement of the third lobe, as the most frequent cause of retention of urine in old men, where no disease of the urethra is present; however, he appears to have magnified the importance of the prostate, when examining the diseases of this gland. Serres coincides with him, in maintaining that this organ consists of two lobes, united beneath the urethra only, by the third. This agrees with the notions of Amussat; but should we think otherwise, it follows that the urethra must be nearer the rectum.

However this may be, the importance of this organ, in relation to lithotomy, is such as to require much more attention than has been lately given to it, and consequently we cannot consider it too accurately. Every practical surgeon should make himself thoroughly acquainted with its exact measurements, relation, and density.

In the first place, we should never forget in dividing the urethra, not to prolong in any case, the incision from it; indeed, should we fail in this precaution, the neck of the bladder must suffer in some degree, and the sides of the wound in the prostate will not be held in contact by the dense cellular tissue which surrounds this gland, and by a portion of its structure acting as a sort of bridle, and so cause a separation which allows the urine to be readily effused in the surrounding cellular structure; then we may dread either urinary fistulæ or inflammation of the cellular tissue which surrounds the prostate and neck of the bladder; the latter accident is the most formidable, and the most common of all, and indeed, it alone destroys more patients than all the others combined; when death supervenes in a few weeks after the

operation, peritonitis is sometimes found to be the cause; but the most frequent termination is an inflammation, of greater or less intensity, of the cellular membrane, found between the rectum and prostate; between the latter and the pubis; between the perinæal and pelvic faseiæ, and even in the cellular layer which is interposed between the peritoneum and the bladder, so as to extend to the *fascia propria.* We shall satisfactorily determine this by the *post mortem* examinations of those who have died after the operations below the pubis. Dr. Key fully coincides with us in this opinion: consequently the surgeon should endeavour to divide freely this gland, without deviating in the least from its circumference. The lateral operation, properly so called, presents the greatest number of advantages.

The prostatic portion of the urethra, is expanded into a funnel shape at its union with the bladder; a line or two farther forwards, it becomes somewhat contracted, then enlarges, and again contracts at the commencement of the membranous portion. These appearances are more obvious at the inferior surface. Amussat has revived the exploded opinion of the existence of a sphincter vesicæ; he supposes that there is a true valve in which sometimes transverse muscular fibres are found, which frequently cause the beak of the sound to strike. Amussat calls it the pylorie valve, which, in the majority of subjects, we think, cannot be discovered; but that the point of origin of the urethra is raised here by the third lobe of the prostate, and that all the coats present a greater thickness in this point than elsewhere; the crest, or *verumontanum (caput gallinaginis)* is found in the middle of the cavity observed between this contraction and that forwards. This elevation is placed upon the middle line, and divides the inferior surface of the urethra into two equal portions, over which the instrument must glide in entering the bladder. The beak of the catheter should be directed towards the superior surface of the urethra, in order carefully to avoid making a false passage, as this fold of mucous membrane is very thin here, and the cavity (sinus pocularis) sometimes deep. Lisfranc found this pouch three or four lines deep in some subjects. Great caution is required in the use of bougies, catheters, and caustic, since the irritation of the verumontanum is readily transmitted to the testes by the vasa deferentia. The fold terminates ten lines before the neck of the bladder, and forms a sort of dilated prominence, in the middle of which the common spermatic ducts open: laterally are situated the *prostatic sinuses* and the openings of the ducts, which represent the outline of the letter V in their position, the apex being directed forwards. These sinuses sometimes intercept the passage of instruments. The *Verumontanum* passing backwards to form the uvula, sometimes expands.

"That enlarged part of the canal which runs in the prostate gland, or the prostatic sinus, as some term it, is next to be

considered; and here more sources of difficulty are to be encountered than you might expect; for the point of the instrument, if small, may pass into that sinus described by Morgagni, as seated at the posterior end of the caput gallinaginis; and this, although the instrument should move on in the direction of the canal. This may be avoided by keeping the point of the instrument elevated; and this rule will enable you to avoid another difficulty to which the form of the canal here exposes you; for at each end of the caput gallinaginis, the urethra grows wider and deeper until you arrive at the neck of the bladder. This, the most posterior part of the canal, appears still more deep in consequence of the neck of the bladder forming a sharp and pretty high ridge, interposed between the canal and the bladder. Should the instrument then be moved on either side of the caput gallinaginis along this deepest part, until it reached the furthest extremity of the canal, you must observe, that it could not be pushed into the bladder by then raising its point, without forcibly tearing through the ridge at the neck of the bladder. The pain produced by such violence is extremely severe on the instant, and its consequences may prove very dangerous to a patient of irritable habit. You can then pass the instrument along this last portion of the canal with facility, by depressing the handle, so as to elevate the point in such a degree as will enable you to surmount the ridge formed by the neck of the bladder."*

These sinuses sometimes intercept the passage of instruments. The *Verumontanum* passing backwards to form the uvula, sometimes expands, and produces two small lateral folds concave forwards, which present the appearance of two small valves, not very well marked. This, probably, may be the structure mentioned by Amussat as a sphincter. The enlargement of these folds might certainly produce obstacles to the introduction of instruments. The *Verumontanum* sometimes terminates in a similar manner anteriorly, as we trace it towards the membranous portion; but the concavity of the folds looks backwards. Thus the Verumontanum, with its anterior and posterior folds, will, in such cases, represent the letter *x*; perhaps it is not to be looked upon as very unusual, as I have found it three times, and Professor Langenbeck has taken notice of it.

The dilatability of the prostatic portion of the urethra, is greater superiorly than inferiorly; the difference is very great in this respect, when the prostate does not completely encircle the urethra; the superior parietes is then thick, muscular, very strong, and capable of great expansion, without being lacerated: hence it is difficult to make a false passage in the superior, although it is the reverse in the inferior surface.

The thickness of the urethra at the superior part, is not much

* Colles' Surgical Anatomy, p. 199—200.

altered when the prostate gland is removed; but the inferior surface is very thin, and composed almost of folded mucous membrane, having a delicate layer of fibrous (submucous) structure interposed, which is thickest at both its places of contraction. Indeed the prostatic portion of the urethra, is merely a prolongation of the bladder, having the prostate developed between its coats, so as to form a muscular sheath for this gland. There is an annular thickening at the commencement of the urethra, formed by the folded mucous and sub-mucous tissue.

The prostatic portion of the urethra in the adult, may be dilated six, seven, or eight lines, during the extraction of a calculus. This part is much more elevated in infancy, because the bladder in approaching the umbilicus, draws it behind the pubis. Pregnancy, and distention of the rectum, produce the same results. Amussat has demonstrated that this obliquity of the prostatic portion may be completely removed by extending the penis so as to form an angle with the pubis of forty degrees: by this means the prostate is drawn under the arch of the pubis, and the posterior part of the urethra, which was somewhat elevated, is now made to be on the same plane with the fundus vesicæ; so that a straight staff may be introduced, and that of a larger size, than when curved by pushing, and at the same time rolling the instrument on its axis. By this dilation we are enabled to perform the process of breaking up and extracting the calculous; a method which has so far succeeded, as to induce us to suppose, that it may ultimately altogether supersede the operations of lithotomy.

We, however, would not wish to be understood as stating, that the urethra has not some degree of curvature, but that the curvatures may be effaced sufficiently to admit a straight staff. The female urethra is straight, or nearly so. Now Amussat asks, why the same thing may not be asserted respecting man, as it is not more elevated by the prostate on the one hand, than by the vagina on the other. There is no analogy; for the pelvis of man is narrower, the bladder higher above the pubis, and the symphisis deeper: hence the urethra should be more curved. Leroy has found the symphisis twenty-four and twenty-five lines in depth; but the curvature is so great, even at twenty lines, which is its average, that the introduction of a straight instrument would be very difficult, if not altogether impossible.

b. Membranous portion. It is about one inch long superiorly, and situated beneath the arch of the pubis, from which it is about half an inch distant; in which space the cellular tissue and Wilson's muscle is found.

"The *compressor urethræ* muscle of each side, arises by a tendon from the inside of the symphisis pubis, about one-eight of an inch above the lower edge of the cartilaginous arch, and at nearly the same distance from the attachment of

the ligamentum inferius vesicæ, or tendon of the bladder, to which, and to the tendon of the corresponding muscle, it is connected by very loose cellular membrane. The tendon is at first round; but it flattens as it descends. It is first in contact with, and parallel to the one of the opposite side: it sends off fleshy fibres, which increase in breath; and approaching to the upper surface of the membranous part of the urethra, they separate from those of the corresponding muscle, and pass from the anterior and upper surface over the sides of the whole of the membranous portion, and folding themselves underneath it, again approach the other muscle and unite with it in forming a narrow tendinous line, which, at its anterior and lower extremity, is, by a detachment of its fibres, joined to that common centre in the perinæum where the tendons of the muscles of the perinæum, of the penis, and sphincter ani, are blended with each other. Although some fibres from the lower part of this muscle, seem occasionally to be connected with those of the levator ani, they may, in general, be very easily separated by dividing only cellular membrane. At the upper part, some veins, passing from the sides of the cervix of the bladder to join those which come from the dorsum of the penis, and which pass from the internal iliac trunk, take their course between the compressor urethræ muscle and levator ani, and therefore make a marked distinction between them, that any person attending to this single circumstance, may very easily trace the whole extent of these muscles of the urethra.

From the attachment and course of these muscles, it is clear, that in contracting they will draw the membranous part of the urethra towards, and compress it against the cartilaginous arch of the pubis. They will also contract the circle formed by them so as to close the canal, when neither urine or semen is to pass through it; and as their anterior edge surrounds the narrowest part of the urethra, where that canal enters the bulb, and immediately enlarges, their contraction may form a very powerful impediment to the passage of any instrument to the bladder, although no alteration of structure exists. When the perinæum is made a fixed point, so as to prevent the muscles drawing the membranous part of the urethra nearer to the symphisis of the pubis, it will account for the flatness sometimes observed on the sides of bougies which have been inserted through the part of the canal which these muscles surround. The knowledge of these circumstances, and of the enlargement of the urethra into a bag below the surface, where the canal from the membranous part enters, will induce every surgeon to be cautious of the force he uses in introducing any instrument to the bladder, when it meets with some opposition at this part."*

The dorsal arteries of the penis sometimes unite, to form one

* Wilson on the Urinary Organs.

dorsal branch. This irregularity does not always influence the relation of the internal pudics themselves; but occasionally the dorsal arteries of the penis, arise from one of the branches of the internal iliac. I have found this irregularity in two subjects, and in tracing it in those instances, from before backwards, it was remarked, that while without the pelvis, the artery was single, which within this cavity bifurcated before the neck of the bladder, and these branches communicated with the vesical or ischiatic arteries. This irregular distribution must almost necessarily cause hemorrhage in lithotomy, if performed according to the methods of Foubert, Dupuytren, Thomson, and Scarpa.

The membranous portion of the urethra, appears shorter inferiorly, because the bulb and prostate approximate each other: hence there is a sort of groove, which must be divided in the lateral operation of lithotomy. This groove, bounded posteriorly by the anterior part of the rectum, anteriorly by the bulb, laterally by the vesical fasciæ, and at the anterior part by the rectal layer of the obturator and levator fasciæ; inferiorly by the posterior layer of the triangular ligament of the urethra: this groove is filled by dense and fibrous cellular structure, by some small arteries and veins, and between the aponeurosis and the integument, by the crossing of the transverse muscles of the perinæum, the arteries of the bulb, and the superficial fasciæ. The membranous part of the urethra, is immediately surrounded by a continuation of the capsule of the prostate, which gives more security and strength than might at first be supposed.

The membranous portion of the urethra is of less diameter than that contained within the prostate; so that it expands in passing into the latter, and is still further dilated in entering the bulbous portion. At the junction of the membranous and spongy portions of the urethra, false passages are found, the result of the forcible introduction of instruments. The membranous part of the urethra becomes thinner in proportion as it enlarges anteriorly and posteriorly, because its external lamina separate to envelope the prostate or the bulb; it is therefore strongest in the middle; the sound, also, cannot deviate in the urethra, until about to enter the membranous portion, or when it has passed this division of the canal, more especially as it is incased by a production from the posterior layer of the triangular ligament, which it perforates as it leaves the pelvis. The urethra becomes very much elevated, on account of its next proceeding forwards between the corpora cavernosa. We should remember, that if the instrument makes a false passage here it may continue to pass under the aponeurosis as far as the false perinæum; so that this injury is of a less dangerous nature than the instance where the catheter deviates from the urethra, but contiguous to the prostate and neck of the bladder. These

obstacles are to be met with at the inferior part of the urethra only, for the catheter is never obstructed as long as we guide its point along its superior surface. Indeed the membranous portion of the urethra, resembles very much in structure the bladder itself, since a muscular coat is found here also. The older anatomists justly remarked, that the reservoir of urine, and its canal, were in continuity, and identical as to structure; so that perhaps the old name of *muscular*, was preferable to that of membranous, which it is now called.

c. The *Bulbous Portion* is the commencement of the *corpus spongiosum urethræ*, which is continued posteriorly and inferiorly to the canal, under the appearance of a pyriform enlargement, which is called the bulb of the urethra. The superficial fasciæ, and the accelerator urinæ muscle, separate it from the integument; so that it may be felt externally in thin persons—its distance from the anus is about an inch, and sometimes much less. In entering the membranous portion in lithotomy, we have to avoid a wound of the rectum. Should we on the one hand, cut too much backwards, and a division of the spongy portion, should we make the incision at more than an inch from this intestine. There is certainly less danger in the latter than in the former instance; although we should have a hemorrhage from the transverse artery of the perinæum, and even from the artery of the bulb; by dividing the coverings of the bulb much more anteriorly, we avoid both those bad consequences. With this intention, after the first incision, we use the left index finger to press the right lip of the wound to this side, employing at the same time the nail of this finger as a director for our second incision. In this way we entirely avoid the rectum; the artery of the bulb is the only one which might be divided; and as it is seldom avoided, even when the incision is made very far forwards, we cannot see why the lateral operation should be commenced fifteen or eighteen lines before the anus. In the *apparatus major* the bulb was always divided, as the incision was made on the median line. In the *apparatus minor* (the method of Celsus) it was always avoided, as also in that of Beclard and Dupuytren. The concavity of the semilunar incision should be six, eight, or ten lines before the anus. By Sanson and Vacca's method, in the recto-vesical operation, the bulbous and the greater part of the membranous portions of the urethra remain undivided.

The direction of the urethra is different from that of the bulb when viewed from before backwards. Amussat conceives that this peculiarity proves that the canal is straight, or nearly so; it, however, appears to us to indicate precisely the reverse. Indeed, in erection, or when the penis assumes that position in some degree, the bulb is prolonged posteriorly, in the direction of the anus. If this were the case with the urethra, it would then be perfectly straight; but on the contrary it separates from

the bulb to ascend to the prostate. In dividing the parts in the perinæum, during lithotomy, we have to pass through the depth of an inch, or an inch and half, and sometimes more. Hence it follows, that in the natural state of the parts, the curvature of the urethra under the arch of the pubis, is very marked. However, this curvature may be so diminished, or almost obliterated, by extending the penis, as readily to admit the introduction of straight sounds into the bladder; but unless contra-indicated it is better to use curved ones.

The bulb, when considered in relation to the urethra, is at first separated from it by a triangular space, which is part of the *bulbo-rectal* space; it soon arrives at the inferior surface of the urethra, and terminates some lines forwards, by forming a layer which almost entirely envelopes it; or perhaps it may be described, that the erectile tissue originally included between the layers of the urethra, is gradually expanded, or in a measure blown out, so as to form the bulb, inferiorly and posteriorly. Thus a considerably expanded erectile tissue, intervening between the mucous membrane of the urethra, internally, and the fibrous envelope, externally, renders the bulb weak and readily lacerated; before it joins the membranous portion, the contraction of this part appears to be occasioned by the approximation and most intimate union of these layers.

This portion of the canal terminates at the commencement of the inferior groove of the penis. It is now named

c. The *Spongy Portion.* It is not separated from the bulbous portion by any line of demarcation. Externally it diminishes gradually to the anterior extremity of the corpora cavernosa, where it is again expanded, or blown out, as it were, to form the glans penis; the erectile tissue included between the laminæ, as before mentioned, is denser as it proceeds from the bulb. The urethra is very much contracted during erection, as the fibrous tissue which envelopes it is unyielding: hence the flow of urine is difficult in this state of the organ, which is, on the other hand, very favourable to the emission of semen, because being first poured from the spermatic ducts into the prostatic portion of the urethra, its force and velocity are increased by passing from a large space through a narrow tube. The compressores urethræ assist the ejaculatores seminis in this action. The remaining part of the urethra is only covered by the integument and superficial fascia of the penis; superiorly it is very closely united with the groove of the penis, so much so that it has been supposed that the urethra was developed between the layers of the fibrous sheath of the corpora cavernosa; but the only actual connection is by means of fibrous filaments and very small vessels, which admit fine injection thrown from the bulb, to pass into the corpora cavernosa, and vice versa.

The spongy portion of the urethra is very little contracted internally, from behind forwards; it expands behind the

meatus urinarius, and there forms the fossa navicularis, which, like the other dilatations of the urethra, exists at its inferior surface: this is the usual seat of inflammation in gonorrhœa; and indeed some have supposed that the disease becomes dangerous, whenever it exceeds this point.

The colour of the mucous membrane of the urethra, is reddish white; a whitish line extends (sometimes well marked) upon each surface, and continues as far as the bladder. Several modern anatomists consider this as a sort of suture, resulting from the primitive union, of the halves of which the urethra is composed in fœtal life.

The urethra, when collapsed, has its mucous membrane thrown into longitudinal folds: this does not occur in the fossa navicularis; transverse, or semilunar folds, with their concavity forwards, are found between the longitudinal, but not so well marked as these. The transverse are valvular, and bound small spaces, which have been called the *Lacunæ Morgagni;* they are seldom so considerable as to obstruct the introduction of an instrument.

The following are the obstacles to the passage of a catheter into the bladder:—First, the orifice of the urethra, sometimes very much contracted, when compared with the fossa navicularis. Having once passed the posterior boundary of the fossa, we proceed, without any difficulty, as far as the suspensory ligament of the penis; should the point of the instrument be guided along the superior surface, because we incur the danger of forming folds of the lining membrane, by allowing the catheter to glide along the inferior surface. The urethra seems to be weakened at this part by those semilunar folds which occur during its collapsed state. This circumstance requires the surgeon's attention. After this the instrument proceeds without interruption to the bulbous portion. Should the beak of the catheter not be exactly applied upon the superior surface, it is liable to deviate, and so lacerate the sinus of the bulb. The instrument passes with facility through the membranous portion of the urethra into the prostatic. The verumontanum may here be wounded, should the instrument be obstructed in its central depression when it is very deep, and tear the bottom of the cavity: indeed should the fold named by Amussat the *pyloric valve*, be developed to a certain extent, it forms the last obstacle, which can only be surmounted by raising the beak of the instrument. In this operation we have to remember, that the urethra may be gradually dilated, so as to admit the introduction of a cylinder, of four or five lines in diameter, and that it is so elastic as quickly to resume its former dimensions after such dilation. Hence, in strictures, the continued employment of the bougie is required; and again, large straight instruments are now used preparatory to the operation of lithotrity.

The meatus urinarius sometimes does not extend to the extre-

mity of the penis, or it may be found on its inferior surface, near the pubis, or still more unusually, on its dorsum.

10. NECK OF THE BLADDER,

Is that portion included between the reflexion of the peritoneum and the commencement of the prostate. We agree with Scarpa, in considering that part found within the prostate to belong more properly to the urethra.

This part of the bladder is enveloped anteriorly and laterally by a plexiform arrangement of veins, very well marked in those who have been affected with chronic disease of this reservoir; the plexus is included in reticular, elastic, and extensible cellular structure, sometimes in great quantity, dipping between the pubis and bladder, even above the symphisis. This cellular layer is continued round the prostatic portion of the urethra; it makes a separation between the neck of the bladder, the levator ani, and pelvic fasciæ. When Thomson's method is adopted, of dividing the prostate from below upwards, the superior surface of the urethra and termination of the bladder, the urinary inflammation, or simple phlegmon, is often the consequence. The same results from the lateral operation, but much more frequently from that adopted by Foubert and Thomas, which almost always causes effusion of urine, and perhaps urinary fistula, cicatrization slowly takes place; because, the fibres being cut across, the lips of the wound separate at each contraction of this organ. The dangers of this operation may be explained, when we consider the facility with which the bistoury may turn in three directions. Posteriorly, we may wound the rectum, externally, the peritoneum, or indeed we may injure the several parts, should the bladder not be sufficiently distended.

The inferior fundus, or posterior and inferior part of the neck, is the most interesting; it is connected to the rectum by a cellular layer, in general very dense and reticular in the middle line, but loose laterally; and thus by their intimate union, the *recto-vesical* septum is formed, which is so thin as to enable one to feel, by a finger introduced per anum, even the form of a solid body, contained in the bladder. It has been recommended to enter this reservoir by the rectum, as there are no large vessels or important organs in this situation. Flourant performed paracentesis of the bladder, and Sanson proposed lithotomy here. The instrument should not, in either case, penetrate the rectum more than an inch and a half, or two inches above the prostate, as the peritoneum generally descends on the rectum to this distance from that gland, before it becomes reflected on the back of the bladder. This membrane is so closely united to both these viscera, that its position is seldom changed; and thus, a wound of this important membrane may, with cer-

tainty, be avoided. Cellular structure, usually adipose, fills the lateral spaces, which result from the application of the bladder to the rectum. The vesiculæ seminales, vasa deferentia, and termination of the ureters are placed here.

The last-mentioned vessels run in a valvular like manner, without and above the inferior fundus; so they are not in the way of injury in the two operations which we have spoken of. The vesiculæ, bounded as they are on their internal sides by the vasa deferentia, include a triangle, the apex of which passes into the posterior part of the prostate, and this is the only space in which we can operate with safety. It is very difficult to cut precisely on the median line, in the recto-vesical operation; for, although the incision may approach the gland only in a small degree, yet a wound of the vas deferens, and the right or left conjoined spermatic duct may be the almost inevitable consequence. It is also obvious, that if the section does not strictly correspond to the median line, the urine readily effused from this or some other cause, may pass into the cellular structure, and soon become fatal. Again, it is well known that wounds of the neck of the bladder almost always become fistulous: perhaps this may be explained by the arrangement of the muscular fibres, and of the surrounding parts: the former are of two kinds, the longitudinal, which are in greater number laterally, and anteriorly: the transverse, on the other hand, predominate downwards and backwards, where they form the trigone. Now when a wound of the bladder is made perpendicular to the axis of its parietes, as in the lateral, or in a parallel direction as in the recto-vesical operation, both order of fibres produce a separation of the parts, and as there is no solid support, cicatrization becomes difficult: hence it may be supposed that lithotomy is dangerous, when the operation is employed of cutting the recto-vesical parietes between the prostate gland and peritoneal septum. Sometimes the inferior fundus of the bladder is concave, and forms a sort of groove, applied upon the anterior part of the rectum. In this case, the recto-vesical, or lateralised operations would be much easier, and less formidable, than in the instance of a contrary arrangement.

The neck of the bladder internally, is almost funnel-shaped, and somewhat triangular, the apex of which corresponds to the urethra; the inferior surface is formed by the trigone; this part rests principally on the rectum, in its middle; laterally upon the vesiculæ seminales, and receiving the openings of the ureters at the angles of its base. Since the ureters proceed in a valvular-like manner, for the space of five or six lines between the coats of the bladder, it follows, from this arrangement, that the urine readily distils, as it were, into this reservoir, and at the same time regurgitation is effectually prevented by the pressure exercised on the included ureters; so that the urine, in this instance, acts as water contained in the chambers of a

pump-sucker. The trigone, and the whole of the fundus, are usually on a plane, inferior to that of the commencement of the urethra, which is raised by the prostate: this pouch is scarcely, or in no degree, developed in early life; an accumulation of fæces in the rectum, also obliterates it; and in those who are fat, it is pushed up very high above the pubis, so as to render puncture of the bladder, from the rectum, almost impossible, or at least very dangerous. At the union of the neck of the bladder and the urethra, there are situated the verumontanum, the uvula, and also the sphincter vesicæ; but the last is not always present.

11. RECTUM.

This organ is included in the perinæal region as far as the cul de sac, which is formed by the reflection of the peritoneum from this intestine, on the bladder. It descends obliquely forwards, between the sacrum and the inferior fundus vesicæ, in a direction parallel to the prostate; it then makes a slight curvature backwards, and terminates in the anus. This portion of the rectum, considered generally, presents a marked convexity, corresponding to the posterior surface of the prostate, and a concavity, including within it the coccyx: hence it is necessary, when we introduce a foreign body into this intestine, to direct it at first obliquely upwards, and forwards, for about two inches, and after this to incline it upwards, and backwards. The turning backwards of the inferior portion of the rectum, leaves a triangular space between its anterior surface and the bulb of the urethra, which the instrument passes through in the operation of lithotomy. This triangle is bounded, upwards and forwards, by the membranous portion of the urethra, as far as the bulb; posteriorly by the anterior surface of the intestine, from the apex of the prostate, to the anus, and inferiorly, by the integument which forms the base. Laterally this space is bounded by the levator fascia. The bulb of the urethra is included in it, inferiorly and anteriorly; and the apex of the prostate, posteriorly and superiorly. The following parts are placed between the integument and the urethra:—superficial fascia—origin of accelerator urinæ muscle, interlaced with the termination of the external sphincter, and transversus perinæi—the termination of the artery of the bulb—some fibres of the levator ani—dense and resisting cellular structure—the base of the triangular ligament, and the membranous portion of the urethra. If the convexity of the rectum, which is the posterior boundary of this triangle, be very considerable, the incision in the lateral operation should not be less than an inch before the anus. In operating according to the method of Celsus, the rectum is generally wounded before arriving at the prostate.

This accident is of most frequent occurrence where the intestine is much dilated above the sphincter. We understand it happened once when operating according to Dupuytren's method. The rectum is almost uniformly concave forwards, when the anus is directed but a little backwards, as occurs in children. The veins in the cellular structure interposed, and uniting the fundus vesicæ and prostate to the rectum, are sometimes so enlarged in those habitually constipated; affected with chronic disease of the bladder; calculus of long standing, or advanced in life, that their division, inevitable in the recto-vesical operation, and not always avoided in the lateral, causes considerable hemorrhage. The same circumstances influence the rectum, chiefly in the aged; so that it dilates considerably above the anus, and is then rather grooved, than rounded, on its anterior surface; the prostate and fundus vesicæ are lodged in this depression; the intestine being raised in a greater or less degree on each side, it is difficult to avoid a wound of it in the lateral and transverse operations of lithotomy, particularly as the pouch of the rectum is usually more prominent on the left, than the right side. Sometimes, also, this intestine is completely turned from this side of the pelvis, and in some cases, inclines even remarkably to the right. These relations being considered, it is fortunate that stercoraceous abscesses seldom form before the anus, for an operation for fistula, in this situation, would endanger the urethra, neck of the bladder, vesiculæ seminales, vasa deferentia, and very large arteries.

Posteriorly, and laterally, the rectum is separated from the anterior surface of the coccyx, the coccygeus and levator ani muscles, by a great quantity of loose, elastic, and sometimes adipose cellular structure, in which are some branches of the middle sacral artery, and filaments of the sacral plexus, &c. Hence, when phlegmon sets in, much pus is soon formed, which passes much more readily into the abdomen, than towards the perinæum. Lower down, beneath the recto-vesical aponeurosis, the rectum is surrounded by the muscles above mentioned, and the external sphincter; the depression between the rectum and tuberosity of the ischium, is filled with adipose cellular structure: hence this latter portion only is denuded by stercoraceous abscesses, should the muscular septum of the perinæum, and the two fibrous layers (levator and pelvic fasciæ) which cover them, be not disorganised; but if perforated in some parts, the case is then very dangerous, and often hopeless.

The rectum is contracted when invested by the sphincter ani, and the levator fascia; it is thrown into longitudinal folds internally; these are crossed or united by transverse ones, which form small valves, having their concavities looking upwards. Some suppose that these lacunæ favour the formation of fistula in ano, because irritating substances arrested by them, excite ulceration, which soon produces phlegmonous abscess and fistula; but the distance from the anus at which these open into the

rectum, has been the subject of much difference of opinion. Should the internal opening be high up, much danger is said to be incurred of wounding the peritoneum during the operation; but it is four or five inches from the anus to the highest part of the fundus vesicæ, upon which the peritoneum is reflected: this membrane always descends less upon the rectum posteriorly and laterally where fistula usually occur; the opening in the integuments is generally upon a plane, much inferior to that of the anus; from which it follows, that we may cut to the extent of six inches, without endangering the peritoneum. Besides, should the rectum be divided above the pelvic fascia, an abscess may form in the pelvis, and be conducted outwards by this fascia: hence it may be concluded, that the superior part of the fistula is below the peritoneum.

The mucous membrane which lines the rectum, is extensible, thick, and united to the muscular coat by loose and elastic cellular structure: hence there may be inversion of the villous coat forming the disease, named prolapsus ani. Dupuytren radically cured this affection by removing some portion of the soft integument which encircles the anus. The principle of the treatment appears to be this—the inferior portion of the rectum is kept on the stretch, the skin made more tense, and the sphincters more firmly sustained by the surrounding parts, in consequence of the cicatrization of the integument.

The muscular coat is formed almost exclusively of longitudinal fibres, or in a great degree, at least, as far as the prostate, from this, of circular fibres, which gradually increase in number to the anus, where they constitute the sphincter. The superior hemorrhoidal arteries, which are the terminations of the inferior mesenteric, form a very complicated net-work between the muscular fibres, and are ultimately expanded on the mucous membrane; these branches are often of considerable size, even inferiorly, and are principally distributed in the middle of the posterior part of this intestine: hence their division in the operation for fistula in ano, may be followed by a troublesome hemorrhage.

The veins accompanying the superior hemorrhoidal arteries are much larger. Since they constitute branches of the great mesenteric, and are deprived of valves, the application of leeches about the anus is a practice eminently useful in dysentery and general congestion, on account of its almost directly unloading the portal system. The ancients were not ignorant of its efficacy in diseases of the liver. These vessels form a net-work round the anus, between the sphincter and integument; between the mucous membrane and muscular coat, and are sometimes altered into a sort of erectic tissue, which Recamier considers the organic cause of hemorrhoids, although they are regarded by others as mere varicose and dilated veins. Ribes views them

as the primitive cause of some fistulæ, as they may excoriate, and so open into the rectum.

The following are some of the malformations of the rectum: simple contraction of the anus—obliteration above a natural anus—closure of this opening by a membrane different from the integument, and variable in its position—sometimes no trace of anus—obliteration throughout, or complete deficiency—sometimes opens into the urethra, the bladder, the vagina, or elsewhere. In those cases of imperforate rectum, an operation for artificial anus has been proposed and practised in the iliac or lumbar regions.

The foregoing are the parts which compose the perinæum in the male; we shall now recapitulate, following the order of their superposition, not, however, enumerating the frequent varieties of their thickness, and transverse dimensions. Dupuytren examined twenty-three subjects, and found, as extremes, two inches and three inches and a half between the tuberosities of the ischia—one inch some lines, to four inches, between the neck of the bladder and integument of the perinæum. We have repeated this measurement in forty subjects—the results coincide with his, as to thickness; but the separation of the ischia was from one inch nine lines, to four inches.

Upon the middle line, anterior to the anus, we find—

1. The integument and raphe, of considerable thickness.

2. Superficial fascia, of a reddish white colour, appearing sometimes like muscular membrane, very thick, and includes very small arteries and veins.

3. The superficial layer of the perinæal aponeurosis, (deep fascia of the perinæum,) and the anterior extremity of the sphincter ani.

4. Accelerator urinæ; transversus perinæi muscles, and branches of the artery of the bulb.

5. Bulb of the urethra, surrounded by the anterior prolongation of the triangular ligament of the urethra; then the depression between the rectum and the bulb.

6. Bulbous and membranous portions of the urethra; the former beneath the triangular ligament the latter in a great degree above it.

7. Triangular ligament, pierced by the urethra, and continuous with the sub-pubic ligament.

8. Prostate, and prostatic portion of the urethra, in which are, the openings of the conjoined spermatic ducts, those of the prostate and the verumontanum.

The following parts are found between the coccyx and the bladder:—

1. Integument—very thick behind the anus; very thin and wrinkled about it.

2. Superficial fascia—very thick near the coccyx; very thin upon the sphincter.

3 Coccygeal attachment of external sphincter, and muscle itself.

4. Thick adipose cellular structure, in which some branches of the external hemorrhoidal artery are distributed.

5. Coccygeus muscle.

6. Posterior surface of the rectum.

7. Cavity of this intestine.

8. Anterior surface.

9. Recto-vesical cellular layer, in which are included the venous plexuses of the prostate; the vasa deferentia, vesiculæ seminales; and laterally, some adipose cellular structure, which, however, is dense and aponeurotic on the median line.

10. Base of prostate and fundus vesicæ.

Laterally and anteriorly are—

1. Integument—thinner than on the median line, and more usually wrinkled.

2. Superficial fascia, in which veins, nerves, and the superficial artery of the perinæum ramify, frequently incloses a great quantity of fat.

3. Deep perinæal fascia; lateral triangle of perinæum (ischio-bulbous triangle) erector penis, and transversus perinæi muscles; and also the artery of the bulb.

4. Corpus cavernosum; triangular ligament of the urethra, including the deep branch of the internal pudic artery between its layers.

5. Cellular tissue, and vessels.

6. Levator ani muscle, and lateral parts of the neck of the bladder.

7. Pelvic fascia. (recto-vesical aponeurosis.)

In the false perinæum there are successively—

1. Integument; thick and dense laterally towards the buttock.

2. A great quantity of lamellated and filamentous adipose cellular structure, occupying the space between the tuberosity of the ischium and rectum, (ischio-rectal space,) in which the external hemorrhoidal artery and nerve ramify, and also a number of veins.

3. Levator fascia. (ischio-rectal aponeurosis.)

4. Levator ani muscle, within which are the side of the rectum and pelvic aponeurosis.

5. Trunk of the internal pudic artery, with its veins and nerve; the obturator internus muscle outwards; and again, the pelvic fascia.

ANO-PERINÆAL REGION.

FEMALE.

This region includes not only the same parts which are in the male, differing somewhat in character, but also the external organs of re-production, in addition to the urethra.

The following are the average measurements, drawn from a great number of subjects:—

From the upper margin of the pubis to the clitoris, two inches and a half.

From the anterior commissure of the vulva to the anus, three inches and a half.

From the clitoris to the posterior commissure of the vulva, an inch and a half.

From the posterior commissure of the vulva to the point of the coccyx, three inches. Thus from the coccyx to the anus, it is about one inch and a half.

From the anus to the vulva, an inch and a quarter, and the rest for the opening of the rectum.

The transverse measurements are to be considered with the skeleton.

1. The *integument* is thicker than in the male; its cutaneous character is confounded with the mucous membrane, as it folds to form the alæ majores; the sebaceous secretion more abundant and somewhat different, frequently undergoes a morbid alteration where it is allowed to accumulate, and so irritates as to produce the symptoms of gonorrhæa.

The alæ minores, or nymphæ, are merely a fold of integument: their morbid enlargement among the Houzwâanas and Bushman females, has been described by travellers; and Flourens verified the fact, in his dissection of the Hottentot Venus. In the perinæum, properly so called, the integument is the same as in the male, and also presents a raphe in the median line.

2. *Superficial fascia*, is very thick upon the alæ majores and minores; the vessels, nerves, and adipose substance, form a thick, elastic, very dense, and, as it were, erectile structure, in which painful inflammation occurs, soon terminating in suppuration, which may be prevented by the timely application of leeches; but should matter be produced, an early opening ought to be made, in order to avoid a great and rapid disorganization.

3. *Aponeurosis*, forms a larger opening than in the male; it surrounds the vulva, sometimes so dense as to very much retard, during parturition, the dilation of this part, or the introduction of the hand into the rectum, or vagina, especially in first cases.

4. *Muscles*. The coccygeus, erector penis, and levator ani, are similar to those of the male; but the sphincter ani, and accelerator urinæ, are somewhat different; the anterior fibres of the sphincter often uninterruptedly decussate with those of the transversus perinæi, which then appears as lateral processes of it. The latter (sphincter vaginæ) forms a second sphincter which surrounds and contracts the opening of the vagina.

5. *Arteries* are of less size than in the male; the superficial artery is distributed in the alæ majores, and is so small as never to give a dangerous hemorrhage from its division: the internal pudic is almost lost when it aproaches the arch of the pubis; its

trunk is too far from the median line, to be wounded in any of the operations of lithotomy.

6 *Veins*; 7 *lymphatics*; 8 *nerves*, follow the course of the arteries.

9. *Urethra*; its shortness, extensibility, and structure, are remarkable; its length is from ten to fourteen lines; of a conical form, and very dilatable, so much so, as often to admit of the spontaneous passage of calculi of two, three, and four ounces. This property has been taken advantage of in the use of artificial dilation, which has been employed as a substitute for lithotomy. It is surrounded by a very thick erectile layer, instead of a prostate. The urethra is a mere prolongation of the bladder, somewhat concave upon its anterior surface; however, it allows the introduction of a straight instrument; during pregnancy, it is raised against the posterior part of the symphisis pubis, which then becomes, in some measure, perpendicular: hence, the catheter should be very much curved, and flattened to accommodate itself to the form of the urethra. Internally there is no verumontanum, prostatic depression, or valvular fold; it is separated from the arch of the pubis superiorly, by a space of four or five lines. The vestibule is a triangular space, bounded laterally by the alæ minores, and situated between the clitoris and meatus urinarius.

From this depression to the neck of the bladder, passing under the pubis, the following parts are found:—

1. Mucous membrane.

2. Dense cellular layer, containing some vessels and a prolongation of the constrictor vaginæ muscle.

3. The superior part of the perinæal aponeurosis, with the termination of the internal pudic artery, between its layers.

4. Elastic and extensible cellular tissue, and nearer to the canal of the urethra, an erectile layer.

5. Anterior part of the neck of the bladder.

These are the parts which are divided in succession in the operation of lithotomy in the female. But, according to the method of Lisfranc, an opening is made into the bladder, between the pubis and urethra. The great objection to it is the infiltration which takes place into the loose cellular structure, between the pubis and neck of that reservoir.

The urethra is separated from the vagina, in the female, only by a dense and firm, but thin cellular structure; so that lithotomy may be performed by cutting from the latter into the former. It is obvious that there are many advantages in this mode, for there are no vesiculæ seminales, vasa deferentia or spermatic ducts, and the plexus of veins is not so considerable; however, vesico-vaginal fistulæ are more difficult to prevent than those of the rectum; perhaps this may depend upon the absence of a solid body, (prostate) which might preserve the lips of the wound in opposition, and so counteract the action of the mus-

cular fibres. Some contrivances have been effectually adopted by J. Cloquet and Lallemand to remedy this consequence.

The meatus urinarius is narrower than the rest of the canal; it is separated from the opening of the vagina by a more or less prominent tubercle, which is a guide in the introduction of the catheter; it is easily felt in passing the extremity of the middle finger from the fourchette towards the vestibule; the instrument may then be passed, held as a pen along this finger.

10. *Vagina.* Its external opening is bounded by four tubercles, in females who have had children; they are called *caruncuiæ myrtiformes*, and are generally situated superiorly, inferiorly, and laterally; they should not be mistaken for syphilitic productions. The *hymen* is a semilunar fold, the concavity of which looks forwards; it contracts the posterior part of the opening of the vagina: when imperforate, its division is sometimes required. A. Parè has recorded two instances of its presence having obstructed parturition: sometimes there are muscular fibres in this membrane, at others, it consists of a corneous lamina; it never has very large vessels. There are two orders of ridges on the internal surface of the vagina, the one parallel to the direction of the canal, the others oblique.

The parallel ridges are two, one anteriorly, and one posteriorly; they appear to have been formed from the soldering of the two halves in the median line.

The oblique, are more dense; and in the unmarried, they give the same sensation that is felt when the finger is passed over the hard palate of a ruminating animal; chaneres are sometimes concealed under them.

The relations of the vagina to the bladder are such, that during parturition, should the pelvis be contracted, the exertions violent and pains tedious, the head of the fœtus may so press against the vesico-vaginal septum as to cause the formation of a slough, which may terminate in fistula. In operations it is necessary to remember, that the peritoneum only descends to the neck of the uterus, and is seldom continued between it and the bladder.

Its relations with the rectum posteriorly, are also very important. The recto-vaginal septum is formed by the apposition of these two organs with an interposed cellular layer, which becomes denser and thinner as it descends. During parturition this septum is sometimes torn where there is a sacrum of great curvature, and the labour is then completed through the anus: perhaps there may be a slough formed, which, when cast off, leaves a recto-vaginal fistula. As the rectum curves backwards in leaving the anterior surface of the coccyx, so as to present a convexity forwards, and as the vagina, on the other hand, regularly descends in the direction of the axis of the outlet of the pelvis, it follows that there is a triangular separation, bounded anteriorly by the posterior surface of the vagina, posteriorly by

the anterior surface of the rectum, and inferiorly by the integument extended from the anus to the vulva. This triangle is filled by some adipose substance, filamentous and lamellated cellular structure, some fibres of the transverse and sphincter ani muscles, constrictor vaginæ and levator ani, by branches of the transverse artery and a portion of erectile layer which surrounds the vagina inferiorly. The head of the fœtus, when passing through the outlet, presses on and extends the base of this space. The whole structure included in this triangle, becomes flatter, yields, and is dilated: in this way, the female perinæum is prolonged to the length of three, four, or five inches; so much so, that the fœtal head may pass through it without lacerating either the posterior commissure of the vulva, or the anterior part of the anus. Several cases of this sort have occurred, and what is very remarkable, these enormous lacerations usually unite soon and very firmly.

PLATE I.

ANO-PERINÆAL REGION.

1, 1.—Trunk of Pudic Artery.
2.—Inferior Branch of Internal Pudic.
3.—Superior Branch.
4.—Inferior Hemorrhoidal.
5, 5, 5.—Superficial Artery of Penis and Septum.
6.—Transverse Artery of the Perinæum, or Bulbo-urethral.
7, 7, 7.—Inferior Hemorrhoidal Branches.
8.—Trunk of Pudic Artery, seen through the Aponeurosis.
9.—Pudic Vessels going through the Sciatic Notch.
10.—Glutæal Vessels.
11, 11.—Internal Pudic Nerve.
12.—Opening of the Anus.
13, 13.—Circular Fibres of Sphincter Ani.
14, 14, 14, 14.—Elliptical Fibres of the Sphincter.
15.—Accelerator Urinæ Muscle, its Aponeurosis being removed.
16, 16.—Erector Penis.
17, 17.—Transversus Perinæi Muscle, divided into two fasciculi, separated to shew the Bifurcation of the Pudic Artery.
18, 18.—Levator Ani.
19, 19, 19, 19, 19, 19, 19.—Sections and Flaps of the Great Glutæus.
20.—Portion of Glutæus Medius.
21, 21, 21.—Ischio-bulbous Triangle, in which the incision is made in the lateral operation of Lithotomy.
22, 22.—Accelerator Urinæ, covered by Aponeurosis.
23, 23.—Erector Penis, covered by Aponeurosis.
24.—Apex of Coccyx.
25, 25.—Great Sacro-sciatic Ligament.
26, 26, 26.—Musculus Pyriformis.
27, 28.—Tuberosities of Ischium.
29.—Obturator Internus.
29.—(Bis) Flap of Integument thrown down.
30, 30, 30, 30.—Integument covering Glutæi.
31, 31, 31.—Ischio-rectal Excavation, covered by Aponeurosis.
32, 32, 32, 32.———————— with Aponeurosis raised.
33, 33.—Urethra uniting to Corpora Cavernosa.

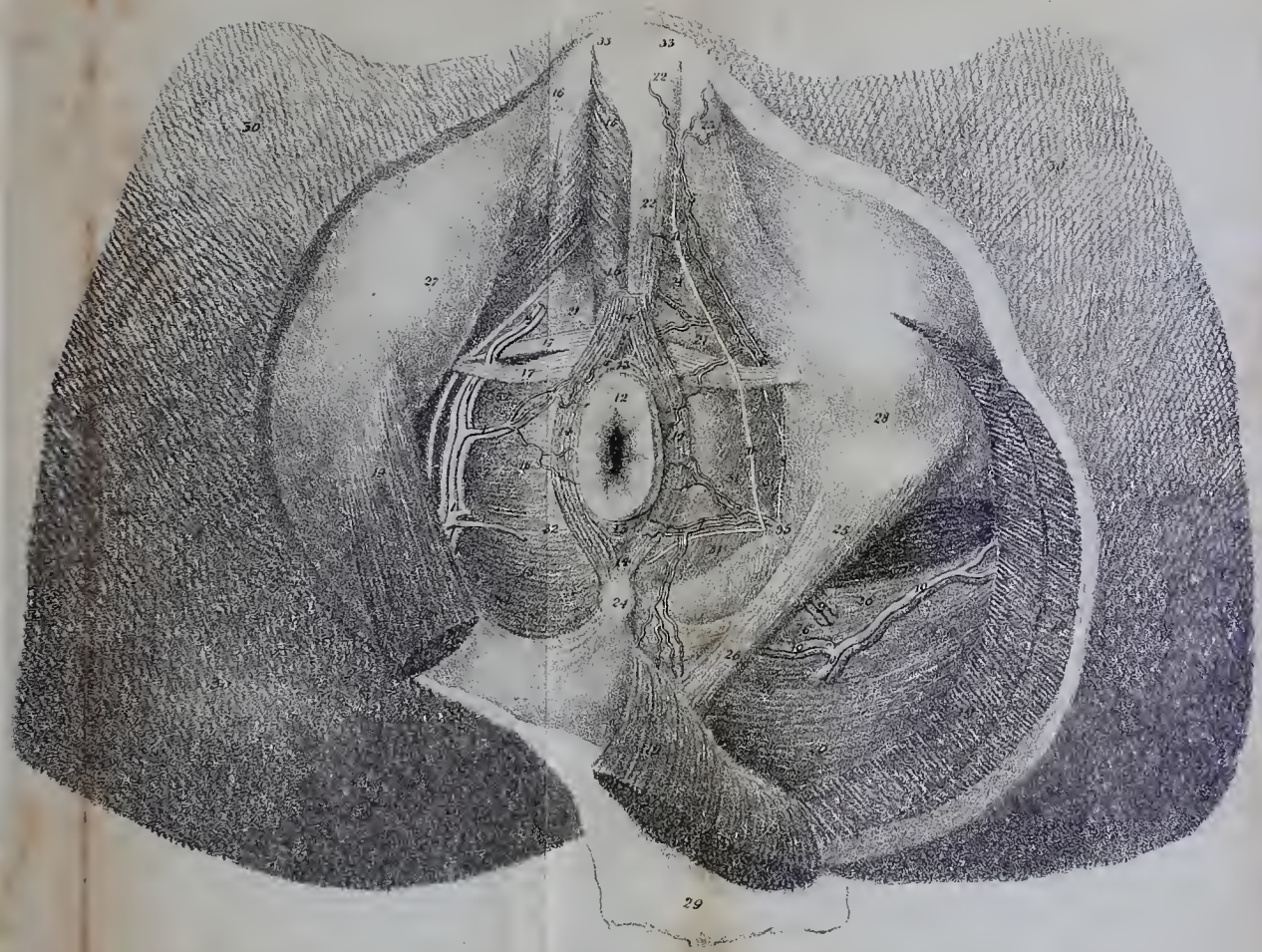


PLATE II.

ANO-PERINÆAL REGION.

The lateral and perinæal surface of the pelvis is here exhibited, the ischium being sawed through immediately under its spinous process, and the ramus of the pubis below its symphysis: the relations of the rectum, prostate, bladder, and origin of the urethra are thus exposed—

1.—Thin Integument, which folds within the Anus.
2.—Bulb of the Urethra.
3.—Prostate.
4.—Vesicula Seminalis.
5.—Cowper's Gland.
6.—Membranous Portion of Urethra.
7.—Rectum.
8, 8, 8.—Sphincter Ani.
9, 9.—Circular Muscular Fibres encircling Anus.
10.—Wilson's Muscle (Constrictor or Compressor Urethræ).
11.—Left Crus Penis, its muscle being removed.
12.—Right Crus Penis, divided and thrown under the Urethra.
13, 13, 13.—Glutæi Muscles, partly cut away.
14.—Posterior Inferior, or Greater Sciatic Ligament.
15.—The same, raised and thrown back.
16.—Anterior Superior, or Less Sciatic Ligament.
17.—Tuberosity of the Ischium.
18.—Coccyx.
19.—Section of Ischium, a little above its Tuberosity.
20.—Division of the descending Ramus of the Pubis.
21.—Acetabulum.
22.—Ischiatic Vessels.
23, 23.—Internal Pudic Vessels.
24.—External Hemorrhoidal Artery from the Pudic.
25.—Artery of the Bulb.
26.—Superficial Artery, going to the Septum Scroti.
27.—Crural Artery, passing over the Pelvis.
28.—Crural Vein.
29.—Crural Nerve.
30.—Pouch of Rectum.
31.—Muscular Parts of the Thigh divided.
32, 32.—Portion of Integument covering Glutæi.
33.—Tendinous Flap of Muscles, which attach themselves to Tuberosity of Ischium.
34, 34.—Superior edge of Obturator Foramen.
35.—Great Sciatic Nerve.